

CLAIMS

1. A liquid injector for causing a syringe to suck a liquid from a liquid tank and inject the liquid into a patient, the syringe having a cylinder member and a piston member inserted slidably into the cylinder member, comprising:

- a patient tube having a leading end connected to the patient;
- a syringe tube having a trailing end connected to the syringe;
- a tank tube having a trailing end connected to the liquid tank;
- tube connecting means for connecting a trailing end of the patient tube, a leading end of the syringe tube, and a leading end of the tank tube;
- a syringe drive mechanism for relatively moving the cylinder member and/or the piston member to cause the syringe to suck and inject the liquid;

- a connection switch mechanism for switching between a suck state in which the patient tube is blocked and the syringe tube is connected to the tank tube and an injection state in which the tank tube is blocked and the syringe tube is connected to the patient tube; and

- interlock control means for interlocking operation of the syringe drive mechanism and operation of the connection switch mechanism.

2. The liquid injector according to claim 1, wherein the connection switch mechanism has an injection block mechanism for pressing the patient tube to freely open or close the patient tube.

3. The liquid injector according to claim 2, wherein the connection switch mechanism also has a switching valve provided at the

position of the tube connecting means.

4. The liquid injector according to claim 2 or 3, wherein the connection switch mechanism also has a suck block mechanism for pressing the tank tube to freely open or close the tank tube.

5. The liquid injector according to claim 4, wherein the connection switch mechanism also has an open or close interlock mechanism for interlocking open and close operation of the injection block mechanism and the suck block mechanism such that one of them performs open operation when the other performs close operation.

6. The liquid injector according to claim 5, wherein the injection block mechanism has an injection press member movably disposed at a position for pressing the patient tube and an injection hold member disposed opposite to the injection press member through the patient tube,

the suck block mechanism has a suck press member movably disposed at a position for pressing the tank tube and a suck hold member disposed opposite to the suck press member through the tank tube, and

the open or close interlock mechanism has a press pivot member having the injection press member and the suck press member formed integrally and supported pivotally.

7. The liquid injector according to claim 5, wherein the injection block mechanism has an injection press member slidably supported at a position for pressing the patient tube and an injection hold member disposed opposite to the injection press member through the patient tube,

the suck block mechanism has a suck press member slidably supported at a position for pressing the tank tube and a suck hold member disposed opposite to the suck press member through the tank tube, and

the open or close interlock mechanism has a crank member pivotally supported on its own trailing end, an injection link member for connecting a leading end of the crank member to the injection press member, and a suck link member for connecting the leading end of the crank member to the suck press member.

8. The liquid injector according to claim 5, wherein the injection block mechanism has an injection press member slidably supported at a position for pressing the patient tube and an injection hold member disposed opposite to the injection press member through the patient tube,

the suck block mechanism has a suck press member slidably supported at a position for pressing the tank tube and a suck hold member disposed opposite to the suck press member through the tank tube, and

the open or close interlock mechanism has a cam member pivotally supported and having a concave and a convex with which the injection press member and the suck press member engage.

9. The liquid injector according to any one of claims 2 to 8, wherein the interlock control means causes the injection block mechanism to block the patient tube when the injection by the syringe drive mechanism is completed.

10. The liquid injector according to any one of claims 1 to 9, further comprising an injection block sensor for sensing the patient tube

being blocked and a suck block sensor for sensing the tank tube being blocked,

wherein the interlock control means causes the syringe drive mechanism to perform the suck after the injection block sensor senses the blocking and causes the syringe drive mechanism to perform the injection after the suck block sensor senses the blocking.

11. The liquid injector according to any one of claims 1 to 10, further comprising a one-way valve for regulating the movement of the liquid from the syringe to the patient, the one-way valve being provided for the patient tube.

12. The liquid injector according to any one of claims 1 to 11, further comprising a one-way valve for regulating the movement of the liquid from the liquid tank to the syringe, the one-way valve being provided for the tank tube.

13. The liquid injector according to any one of claims 1 to 12, further comprising an attachment tube having a trailing end connected to a solution injector for injecting a solution into the patient, tube attaching means for attaching a leading end of the attachment tube to the patient tube, and an Attachment block mechanism for pressing and blocking the attachment tube to freely open or close the attachment tube,

wherein the interlock control means causes the Attachment block mechanism to release the blocking only when the connection switch mechanism blocks the patient tube.

14. The liquid injector according to claim 13, wherein the tube attaching means attaches the leading end of the attachment tube to a portion between the leading end of the patient tube to the connection switch mechanism.